Chamber Temperature Calibration

The chamber temperature is calibrated by adjustment of ZERO and SPAN potentiometers. Standard temperature is referenced by known resistance test plugs inserted into the J9 connector of the control board. Voltmeter leads are connected to J1 on the control board. All illustrated test points and graphics for this procedure are on the graphics plate or the control board.

Special Tools Required

- A 4-1/2 Decimal Digital Voltmeter. Refer to Appendix A for specifications.
- A ten pin 15°C test plug. Refer to Appendix C for specifications.

  Test plug to have a 105.8 ohm resistance across Pins 8 and 9. Pin 9 jumpered to Pin 10.
- A ten pin 143°C test plug. Refer to Appendix C for specifications.

  Test plug to have a 154.7 ohm resistance across Pins 8 and 9. Pin 9 jumpered to Pin 10.

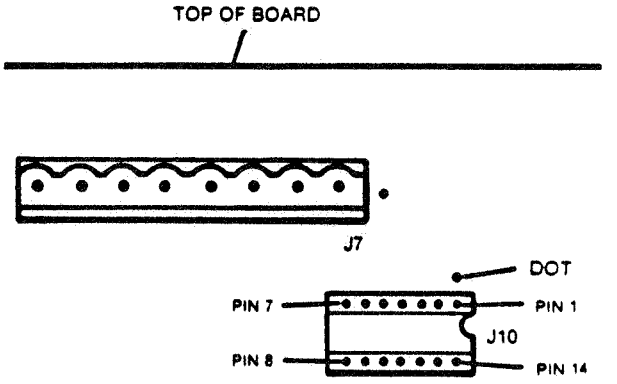
Preparation

1. Turn power ON.
2. Unlock, raise and latch the control head or the upper face panel cover.
3. Loosen two screws and lower the control box cover.

These calibrations are made with the power ON. With power ON, there is always a potential electrical hazard present in Control Box 2A. Only trained service personnel should make these calibrations.

4. Unlatch and carefully lower the control head or the upper face panel cover.
5. Allow 20 minutes for electronics warm up.

Calibration



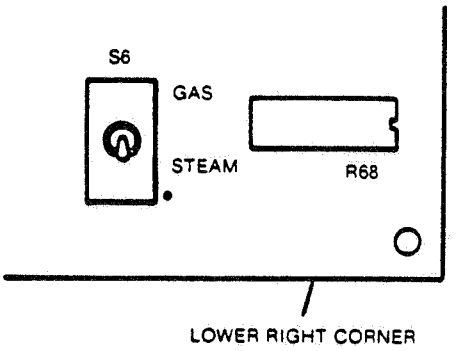
6. Connect Voltmeter to J10 on Control Board Positive terminal to Pin 11. Negative terminal to Pin 12.

7. Obtain *Reference Voltage.*
   - Set meter range.
   - Meter should read near 5.000 volts (± 0.250 volts).
   - Actual meter reading is *Reference Voltage.*
   - Record *Reference Voltage.*
8. Move positive terminal to Pin 14.

NOTE

Set Switch S6 to STEAM for Steam and Washer Sterilizers, set to GAS for EO Sterilizers.

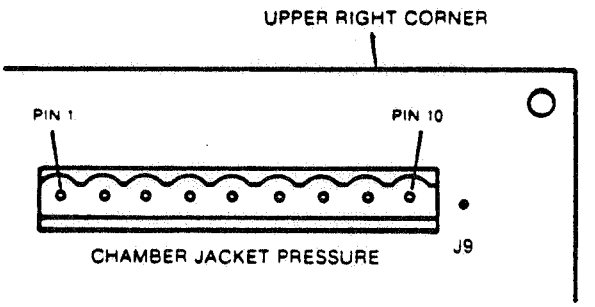
If Display Board is ON, it must be turned off before removing J9.



9. Remove wire harness plug from J9 on Control Board.

CAUTION

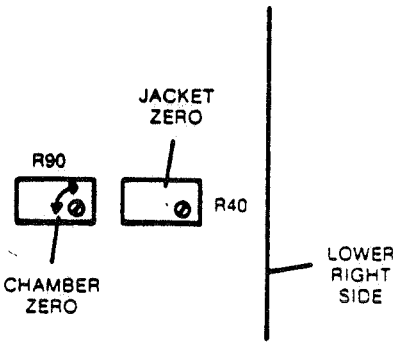
Ensure that all inputs are loaded, chamber temperature, jacket temperature and chamber pressure. An unloaded input could result in an incorrect calibration.



10. Insert 15°C test plug into J9. Set meter resolution to 0.001.
11. Meter should read 0.000 ± 0.005 volts. Adjust CHAMBER ZERO (R90) as close as possible.
12. Remove 15°C test plug from J9. Insert 143°C test plug.
13. Set meter resolution to 0.001. Meter should indicate *Reference Voltage* (near to 5.000 volts).
14. Adjust CHAMBER SPAN (R91) to *Reference Voltage* + 0.040 volts. (*Reference Voltage* obtained in Step 7.)

15. Remove 143°C test plug from J9. Insert 15°C test plug.

16. Adjust CHAMBER ZERO to 0.000 ±0.005 volts.



17. Remove 15°C test plug from J9. Insert 143°C test plug.
18. Adjust CHAMBER SPAN to *Reference Voltage* + 0.040 volts.

19. Repeats Steps 15 thru 18 several times. Readjust CHAMBER ZERO and CHAMBER SPAN as required.
20. Again repeat Steps 15 thru 18 and check for correct voltages.

NOTE ▶ *Final adjustment should always be CHAMBER ZERO. SPAN and ZERO are slightly interactive, but final adjustment is at CHAMBER ZERO.*

21. After final CHAMBER ZERO adjustment, the selector /indicator panel should indicate approximately 15°C, when the 15°C test plug is inserted.

    If the selector/indicator panel does not indicate approximately 15°C under the conditions stated above, the control board or display board has malfunctioned.

22. If the procedure is a series calibration, continue with the Jacket Temperature Calibration,or Chamber Pressure Calibration if an M/C 3525 Washer Sterilizer.
23. If the procedure is an independent calibration, secure the sterilizer, Steps 24 thru 29.

Secure Sterilizer

24. Secure control board.
    - Disconnect voltmeter.
    - Remove test plug and insert cable plug in J9.
25. Raise and latch the control head or the upper face panel cover.
26. Raise and secure the control box cover.
27. Lower and lock the control head or lower the upper face panel cover.
28. To turn controls OFF, press red ⏻ switch.
29. To disconnect power to sterilizer for repair work, depress orange battery pack circuit breaker to OFF (O). Low voltage is disconnected. Depress two white MAINS circuit breakers to OFF (O). Green indicator lights will be OFF.

CAUTION

With white MAINS circuit breakers OFF (O) and green indicator lights off, low voltage power will still be supplied to the controls from the power box battery. Depressing the orange battery pack circuit breaker to OFF (O), disconnects the battery supplied circuit.

Always turn the white MAINS circuit breakers ON (I) before turning the orange battery pack circuit breaker ON (I).

Jacket Temperature Calibration (Steam and EO Sterilizers)

Jacket temperature is calibrated in the same manner as chamber temperature, except for the following tools required and a different positive voltmeter connection to J10. Omit Step 21.

WARNING

These calibrations are made with the power ON. With power ON, there is always a potential electrical hazard present in Control Box 2A. Only trained service personnel should make these calibrations.

Special Tools Required

- A 4-1/2 Decimal Digital Voltmeter. Refer to Appendix A for specifications.
- A ten pin 15°C test plug. Refer to Appendix C for specifications.

  Test plug to have a 105.8 ohm resistance across Pins 5 and 6. Pin 6 jumpered to Pin 7; 105.8 ohm resistance across Pins 8 and 9, Pin 9 jumpered to Pin 10.
- A ten pin 143°C test plug. Refer to Appendix C for specifications.

  Test plug to have a 154.7 ohm resistance across Pins 5 and 6. Pin 6 jumpered to Pin 7; 154.7 ohm resistance across Pins 8 and 9, Pin 9 jumpered to Pin 10.

Voltmeter Connections

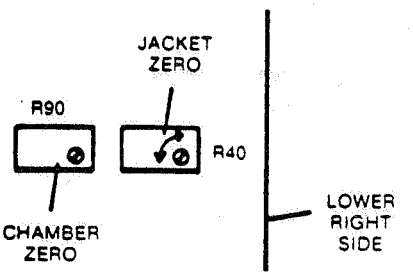
- Connect voltmeter to J10 on Control Board.

  Positive terminal to Pin 1.
  Negative terminal to Pin 12.

Calibration

With the changes identified above, follow the calibration procedure described in this section for "Chamber Temperature Calibration."

Make all adjustments with the JACKET ZERO (R40) and JACKET SPAN (R41) potentiometers as identified below.



Secure Sterilizer

If the procedure is a series calibration, continue with the Pressure Calibration.

Pressure Calibration

Pressure is calibrated by ZERO and SPAN adjustments. Standard pressure is referenced by an absolute pressure meter with accuracy to ±0.05 psia. Voltmeter leads are connected to J1 on the control board. All illustrated test points and graphics for this procedure are located on the graphics plate or the control board.

Special Tools Required

- A 4-1/2 Decimal Digital Voltmeter. Refer to Appendix for specifications.
- A 0 to 50 psia Test Meter accurate to ±0.05 psia. (Must be an absolute pressure meter.) Refer to Appendix B for specifications.

Preparation

1. Turn power ON.
2. Unlock, raise and latch the control head.
3. Loosen two screws and lower the control box cover.

WARNING

These calibrations are made with the power ON. With power ON, there is always a potential electrical hazard present in Control Box 2A. Only trained service personnel should make these calibrations.

4. Unlatch and carefully lower the control head.
5. Allow 20 minutes for electronic warm up.
6. Manually close both doors.

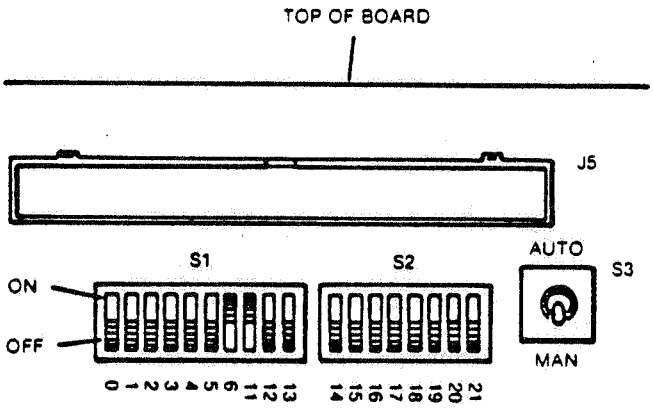
WARNING

Always check, and if required, set MANUAL CONTROL SWITCHES 6 and 11 to ON. This will seal the doors and prevent burns from accidental steam leaks.

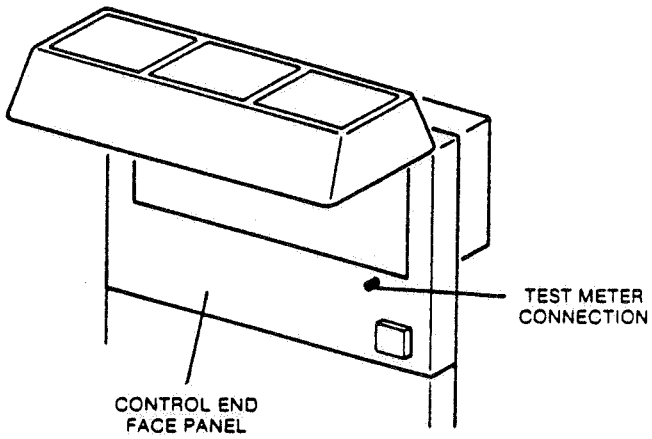
NOTE

EO units should be pressure calibrated and leak tested using 100% Freon.

7. Check MANUAL RELAY CONTROL (S1). Switches should be set as illustrated.



8. Switch RELAY CONTROL SELECT (S3) to MANual.
9. Allow chamber to return to atmospheric pressure.
10. Install a 0 to 50 psia absolute pressure test meter.



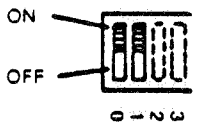
11. Connect Voltmeter to J1 on control panel.
    - Positive terminal to Pin 13.
    - Negative terminal to Pin 12.
12. Place absolute pressure meter above or adjacent to voltmeter for comparison readings.

Calibration

WARNINGS

- *Chamber steam pressure MUST BE MONITORED AND TURNED OFF MANUALLY when the Relay Control Select is set on MANUAL control. There is no automatic pressure control when the control board is in the manual mode.*
- *Check status of door switches. MANUAL RELAY CONTROL SWITCHES 6 and 11 must be in the ON position to seal the doors.*
- *Always manually turn on steam to the jacket and chamber at the same time so that both can be monitored visually.*

13. Set MANUAL RELAY CONTROL Switches 0 and 1 to ON. Steam will enter jacket and chamber.



14. When test meter indicates 45 psia, set 0 and 1 switches to OFF.

15. Voltage should read approximately 4.500 volts.

NOTE

Pressure meter and voltmeter will slowly bleed off. Visually match meters to gauge as readings descend.

16. Adjust voltage (±0.005 Volts) to 1/10th of the pressure meter reading using the PRESSURE SPAN (R17) adjustment. Refer to the table for corresponding voltages.

PRESSURE (PSIA)	VOLTAGE ±0.005V
0.00	0.000
5.00	0.500
10.00	1.000
15.00	1.500
20.00	2.000
25.00	2.500
30.00	3.000
35.00	3.500
40.00	4.000
45.00	4.500
50.00	5.000

17. Set MANUAL RELAY CONTROL Switches 3 and 5 to ON. Draw a vacuum in chamber to 5 psia or less.

NOTE

1. *Draw a vacuum for five minutes. Use this five minute reading for PRESSURE ZERO.*
2. *For EO units, use 28.7 psia for the SPAN adjustment.*

18. Adjust the voltage (±0.005 Volts) to 1/10th of the pressure meter reading using the PRESSURE ZERO (R16) adjustment. Refer to the table for corresponding voltages.
19. Repeat Steps 14 thru 16 several times to fine adjust SPAN and ZERO.
20. Final check SPAN and ZERO for correct voltages.

Secure Sterilizer

WARNING

Always leave MANUAL RELAY CONTROL Switches 6 and 11 in the ON position, ie, with the door sealed. Then in case of an emergency, switching the RELAY CONTROL SELECT to MANual will stop all sterilizer action in a safe condition.

21. Allow chamber to return to atmospheric pressure.
22. Disconnect test meter.
23. Secure control board.
    - Set MANUAL CONTROL RELAY switches 6 and 11 to ON.
    - Set all other MANUAL CONTROL RELAY SWITCHES to OFF.
    - Switch RELAY CONTROL SELECT to AUTO.
    - Disconnect voltmeter.
24. Raise and latch control head or the upper face panel cover.
25. Raise and secure control panel box cover.
26. Lower and lock control head or lower the upper face panel cover.
27. To turn controls OFF, press ⏻ switch.

RECORDER CALIBRATION

- *This calibration should be done only by qualified service personnel.*
- *Recorder calibration should be done at initial installation, once a year, or when there is a major recorder problem.*
- *Always ensure that the control board is in calibration BEFORE attempting recorder calibration.*

Both pens are calibrated for NULL and SPAN. The red pen records *temperature*, the blue pen records *pressure*. The red pen is used on all sterilizers; the blue pen is used only on EO sterilizers. There is no hysterisis or linearity adjustment with this recorder. No calibration should be attempted unless the power has been ON for at least 20 minutes.

Preparation

1. Turn lock or key lock located inside the storage compartment at the lower righthand corner of the back wall on units with a Control End Recorder.
2. Raise and latch the control head or the upper face panel cover.
3. Loosen two screws and lower the control box cover.

These calibrations are made with the power ON. With power ON, there is always a potential electrical hazard present in Control Box 2A. Only trained service personnel should make these calibrations.

4. Carefully lower the control head or the upper face panel cover.
5. Install a new chart on the recorder. Fold back the lower right segment to expose the calibration adjustments.

Special Tools Required

- A ten pin 20°C test plug. Refer to Appendix for Specifications.

  Test plug to have a 107.8 ohm resistance across Pins 8 and 9. Pin 9 jumpered to Pin 10; 107 ohm resistance across Pins 5 and 6, Pin 6 jumpered to Pin 7.

- A ten pin 139°C test plug. Refer to Appendix for Specifications.

  Test plug to have a 153.2 ohm resistance across Pins 8 and 9. Pin 9 jumpered to Pin 10; 153.2 ohm resistance across Pins 5 and 6, Pin 6 jumpered to Pin 7.